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EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS ON THE PISGAH AND NANTAHALA NATIONAL FORESTS, NORTH CAROLINA

By

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INTRODUCTION

Biological evaluations of southern pine beetle infestations were made during August and September 1975 on the Grandfather, French Broad, and Pisgah Ranger Districts of the Pisgah National Forest and on the Tusquitee and Wayah Districts of the Nantahala National Forest (Figs. 1 and 2). The beetle has been active on all of these districts previous to 1975, and suppression projects have been conducted concomitantly.

The infestations in North Carolina are part of a South-wide outbreak that now involves 12 states.

METHODS

Standard aerial sketchmap surveys were made on the five districts.[1/] These surveys of 25 percent on the French Broad District and 50 percent on the Grandfather, Pisgah, Tusquitee, and Wayah Districts were corrected to 100 percent. A total of 31 representative beetle spots were ground checked on the five districts to confirm the identity of the causal agent and to assess the general condition and likely trend of the insect populations.

TECHNICAL INFORMATION

Insect - Southern pine beetle, *Dendroctonus frontalis* Zimm.

Hosts - Southern pine beetle is a native forest pest that will attack all species of southern yellow pine. However, loblolly pine, *Pinus*

1/ Detection of forest pests in the Southeast. 1970. USDA, USFS, SA, S&PF, Div. of FPM, Pub. S&PF-7, Atlanta, Ga., 51 pp.

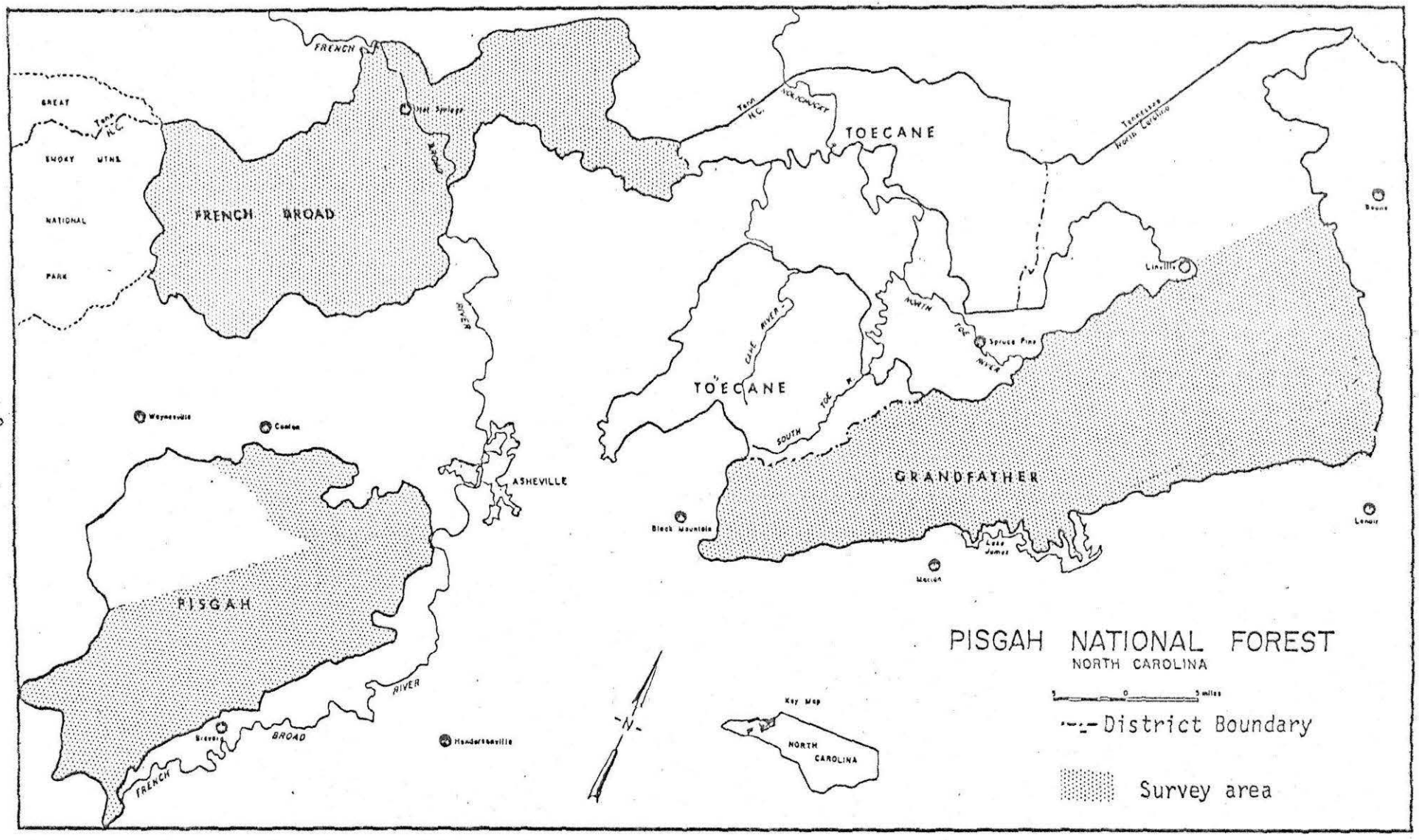

Figure 1. Areas covered by aerial survey for southern pine beetle on the Pisgah National Forest, 1975.

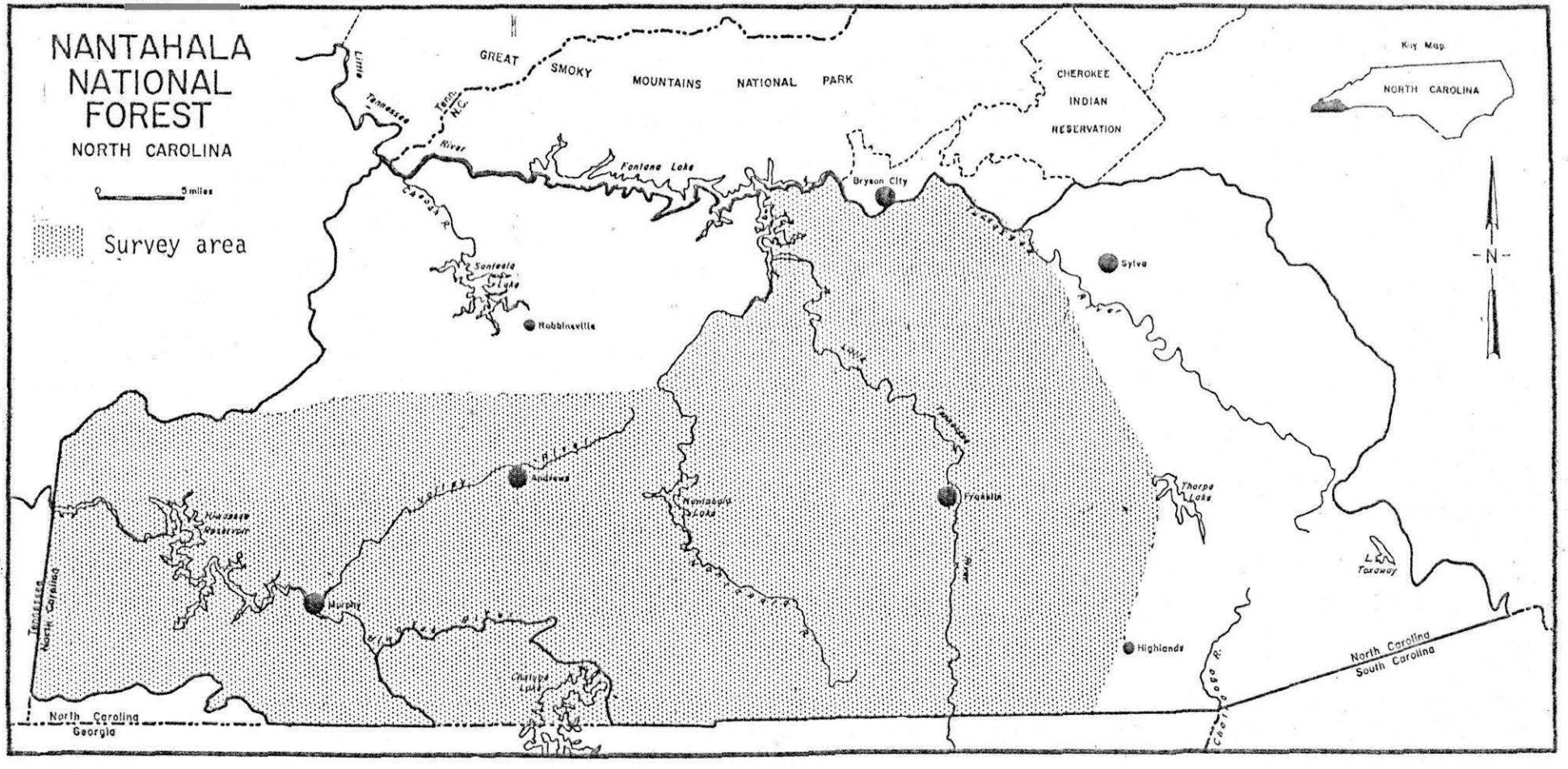

Figure 2. Area covered by aerial survey for southern pine beetle on the Nantahala National Forest, 1975.

taeda L., and shortleaf pine, *P. echinata* Mill., are the preferred hosts.

Type of Damage - Death of the tree is the result of mining in the cambium by the southern pine beetle as it constructs egg galleries. The beetle also introduces blue stain fungi, *Ceratocystis* spp., which slow down or block conduction of water in the stem. The size of an infestation may range from a single tree to several thousand trees.

Life Cycle of the Beetle - Southern pine beetles attack in pairs and construct a winding gallery in the cambium. Eggs are deposited in niches along the sides of the galleries. The eggs hatch into whitish grubs that further mine the cambium and then construct cells in the bark where they pupate and change to adults. The new adults then mine through the bark to emerge. The complete life cycle takes about a month during the summer, and as many as four or five generations may be produced annually in the area.

RESULTS AND DISCUSSION

Survey results are summarized in Tables 1 and 2. The data indicate that the southern pine beetle populations on the five districts have declined somewhat from the fall of 1974. However, the problem continues on all the districts. The total number of active spots at the time of the aerial survey remained high at 809, and the estimated total number of infested trees was over 60,000.

Beetle populations are continuing at a highly destructive level. Suppression efforts should continue at the most intensive level practical.

RECOMMENDATIONS

Where timber resources can justify suppression measures, the districts should continue to follow guidelines outlined in the 5250 section of the Forest Service Manual which are as follows:

1. Removal of Infested Trees by Commercial Sale or Administrative Use. When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of the infested material should begin immediately. Contract time limits should insure rapid removal.

   Where practical, and if host type is present, a 40- to 70-foot buffer strip should be marked and cut adjacent to and ahead of the most recently infested trees. This practice is effective in reducing the possibility of "breakouts". When only a small volume of infested merchantable material occurs in a spot, non-infested trees surrounding the spot may be marked to provide an operable cut.

The order of priority for removing beetle infested timber from a spot should be as follows:

Trees having nearly developed broods (usually the red and fading trees)

Trees having young broods (usually the green, recently infested trees)

Trees in the buffer zone

2. Piling and Burning. Unmerchantable or inacessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burning the bark of infested trees. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the piling and burning operation.

3. Chemical Control. Chemical formulation recommended for southern pine beetle control is a 1/2 percent Lindane spray with No. 2 fuel oil as the carrier. This may be formulated from a 20-percent lindane emulsifiable concentrate or oil concentrate at the rate of 11 pints of concentrate in enough fuel oil to make 55 gallons of spray. (Ratio of one part 20-percent lindane EC to 39 parts No. 2 diesel fuel.)

Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of run-off. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of infested bark. Spray stumps and bark removed by woodpeckers. Low pressure sprayers may be used to treat large, accessible infestations.

The order of priority for cutting and spraying infested trees in large spots is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the chemical control operation.

Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development. To prevent aerial spotters from mapping treated spots, cut trees with red needles from which beetles have emerged.

Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesticide containers and excess chemicals are outlined in section 8.3 of the Forest Service Health and Safety Code and FSM 5242.21. Detailed safety procedures should be outlined in the project suppression plan.

4. Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated within two or three weeks after treatment to check for additional infested trees. If additional trees are found, treat them.

PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key -- out of the reach of children and animals -- away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your handsbecome contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.

Table 1. Summary of results of southern pine beetle evaluations conducted on the French Broad, Grandfather, and Pisgah Districts, Pisgah National Forest, 1975.

	Ownership Unit		
	French Broad	Grandfather	Pisgah (including Bent Cr.Exp.For.)
1. Results compiled from data collected during the aerial phase of the evaluation:			
Survey type	Sketchmap	Sketchmap	Sketchmap
Date of aerial survey	8/4/75	8/4/75	8/5/75
Total acreage surveyed	196,658	428,800	237,576
Total susceptible host type	22,169	123,578	3,154
Total number of spots within the survey boundary	198	65	97
Spots per M acre of host type (trees)	8.9	0.5	31
Average spot size (trees)	121	54	147
Range of spot sizes (trees)	1-350	1-300	1-1500
2. Results compiled from data collected during the ground and aerial phases of the evaluation:			
Date of ground phase	8/11/75	8/21/75	8/7/75
Infested trees per M acre of host type	1134	14	3800
Total number of infested trees within the survey boundary	25,184	1,724	11,781
Ratio of green infested to total red and fading trees	1:2.3	1:8.3	1:3.0
Total volume of infested trees (cu. ft.)	211,545	33,446	127,235

Table 2. Summary of results of southern pine beetle evaluations conducted on the Tusquitee and Wayah Districts, Nantahala National Forest, 1975.

	Ownership Unit	
	Tusquitee	Wayah
1. Results compiled from data collected during the aerial phase of the evaluation:		
Survey type	Sketchmap	Sketchmap
Date of aerial survey	8/5/75	8/5/75
Total acreage surveyed	406,527	424,760
Total susceptible host type	99,534	24,611
Total number of spots within the survey boundary	320	129
Spots per M acre of host type (trees)	3.2	5.2
Average spot size (trees)	133	14
Range of spot sizes (trees)	1-3,000	1-75
2. Results compiled from data collected during the ground and aerial phases of the evaluation:		
Date of ground phase	9/18/75	9/18/75
Infested trees per M acre of host type	214	64
Total number of infested trees within the survey boundary	21,315	1,576
Ratio of green infested to total red and fading trees	1:2.7	1:1.7
Total volume of infested trees (cu. ft.)	464,667	14,184